We Claim

1. A stator core for an electrical machine, the stator core comprising high thermal conductivity components within a low loss stator iron assembly, the high thermal conductivity components distributed and in a proportion relative to the low loss stator iron assembly whereby the stator core remains electromagnetically functional within an electrical machine whilst the high thermal conductivity components in use facilitate heat transfer and dissipation from electromagnetic windings within that machine.

2. A stator core as claimed in claim 1, wherein the low loss stator iron assembly comprises laminations of an appropriate material.

3. A stator core as claimed in claim 2, wherein these laminations are in the range of 0.1 to 0.35mm thick.

4. A stator core as claimed in claim 2, wherein the appropriate material is a high resistivity silicon steel or cobalt iron alloy and each lamination is insulated for eddy current inhibition.

5. A stator core as claimed in claim 1, wherein the high thermal conductivity components comprise laminations within the low loss stator iron assembly

6. A stator core as claimed in claim 2, wherein the high thermal conductivity components comprise coatings applied to the laminations of the low loss stator iron assembly.

7. A stator core as claimed in claim 1, wherein the high thermal conductivity components comprise an adhesive or resin or other matrix which is loaded with a high thermal conductivity material.

8. A stator core as claimed in cliam 7 wherein the high thermal conductivity material comprises carbon fibres or

carbon nanotubes, the carbon fibres or carbon nanotubes are arranged to extend radially.

9. A stator core as claimed in claim 1, wherein the proportion of components of high thermal conductivity is in the range up to 20%.

10. A stator core as claimed in any preceding claim 1, wherein the low loss stator iron assembly presents a repeated pack width in the range of 3mm to 8mm of low loss stator iron either side of a width of high thermal conductivity component in the range of 0.5mm to 1.0mm.

11. A stator core as claimed in claim 1, wherein there is a high thermal conductivity cement, adhesive, paste, gel or other means between the high thermal conductivity components and the low loss stator iron assembly to facilitate good thermal transfer between them.

12. A stator core as claimed in claim 1, wherein the thermal conductivity components have radially outer edges, the radially outer edges of the high thermal conductivity components extend beyond the body of the low loss stator iron assembly to facilitate in use greater heat transfer to a stator housing and/or cooling means for the stator core.

13. A stator core as claimed in claim 12, wherein the radially outer edges of respective adjacent high thermal conductivity components comprise tabs, pins, pedestals or other heat transfer features which are staggered or offset relative to each other between components.

14. A stator core as claimed in claim 12, wherein a high thermal conductivity layer is provided for better thermal contact between the stator core and a housing for the stator core.

15. A stator core as claimed in claim 14 wherein the high thermal conductivity layer is a coating on the outside of the stator core or on the inside of the housing or both.

16. A stator core as claimed in claim 1, wherein the high thermal conductivity components have radially inner edges, the radially inner edges of the high thermal conductivity components extend marginally beyond the stator core in use towards a rotor to facilitate air agitation between them for cooling.

17. A stator core as claimed in claim 1 wherein the high thermal conductivity component is selected from the group comprising copper, aluminium, copper alloy, aluminium alloy, carbon fibre, composite carbon fibre material, carbon fibre copper metal matrix composite, carbon fibre aluminium metal matrix composite, carbon nanotube composite, exfoliated graphite composite, carbon fullerine composite, silicon nitride and aluminium nitride.

18. An electrical machine comprising a rotor, a stator and a core, the core comprising high thermal conductivity components within a low loss iron assembly, the high thermal conductivity components distributed and in a proportion relative to the low loss iron assembly whereby the core remains electromagnetically functional within the electrical machine whilst the high thermal conductivity components in use facilitate heat transfer and dissipation from electro-magnetic windings within the electrical machine.

19. An electrical machine as claimed in claim 18 wherein the electrical machine is a permanent magnet electrical machine.

20. An electrical machine as claimed in claim 19 wherein the rotor carries permanent magnets and the stator carries windings.

21. An electrical machine as claimed in claim 19 wherein the rotor carries windings and the stator carries permanent magnets.

22. An electrical machine as claimed in claim 20 wherein the core is a stator core.

23. An electrical machine as claimed in claim 21 wherein the core is a rotor core.

24. An electrical machine as claimed in claim 18 wherein high thermal conductivity components are arranged at the ends of the core.